

LEARNER'S ACCEPTANCE BASED ON SHACKELL'S USABILITY MODEL FOR SUPPLEMENTARY MOBILE LEARNING OF AN ENGLISH COURSE

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Abstract: The use of mobile phones to facilitate the learning process, the so-called mobile learning (m-learning or mLearning), raises various issues, thus making it critical to study the learner adoption and acceptance of mLearning. In this research, a supplementary instructional materials, supporting a regular classroom (i.e., face-to-face) of English as second language (ESL) course, called MobiEnglish, are developed and implemented, using ready-made commercial products and tools. MobiEnglish, delivered through mobile phones, provides different modes of interactions between the content, students, and instructor. A survey method, employing questionnaire, is used to collect learners' responses. The questionnaire contains 19 items based on a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree," to measure the four constructs of Shackel's usability model (i.e., effectiveness, learnability, flexibility, and attitude). The results of responses show high acceptance level of MobiEnglish, reflecting the potential of using mLearning in teaching ESL. Furthermore, the research reveals that the use of the enhanced features of mobile computing with respect to multimedia (i.e., voice and video) is more appealing to learners of ESL.

1 INTRODUCTION

These days information and communication technologies (ICT) are becoming more mobile and ubiquitous. The lowering cost of mobile devices and the availability of wireless infrastructures are radically transforming the way people access and utilize information resources. The "anytime and anywhere" has evolved as a new paradigm to establish a new dimension for providing services such as mobile commerce (mCommerce), mobile business (mBusiness), etc.

The new paradigm has powerful features and functions such as mobility, reachability, localization, flexibility, and motivational effects due to self controlling and better use of spare time. This opens opportunities in the learning environment, with of course, some challenges and questions, creating "mobile learning," m-learning or mLearning for short, with expected benefits to be reflected in more efficient and improved learning results.

Mobile learning can be defined as any service or facility that supply a learner with general electronic information and educational content that aids in the acquisition of knowledge regardless of location and time (Lehner, 2002), using mobile handheld devices, while the learner and/or the learning material providers could be on the move. Mobile learning is the intersection of mobile computing and e-learning, conveying e-learning through mobile devices using wireless connectivity (Milrad, 2003, Stone, 2007).

Mobile learning has raised various issues, in particular the user interface, which plays an important role toward the implementation of mLearning. Mobile devices, in general, have some weaknesses: very small screen displays, low resolution, low processing power, restricted input capabilities of some of these devices, and limited storage capability, making the viability of mobile technology in learning questionable. Therefore, it is critical to study the learner adoption and acceptance of mLearning.

In this research, we study the acceptance of learners of supplementary instructional materials for a regular classroom of English as a Second Language (ESL) course, also called English as a Foreign Language course (EFL). The supplementary materials are delivered through their mobile phones. In contrast to present mLearning systems for teaching ESL, which support mostly static, non-interactive content, where the learners can only listen and view content, this mobile learning system, called MobiEnglish, provides different modes of interactions between the material, students, and instructor.. MobiEnglish uses ready-made commercial products and tools from Hot Lava Software, namely the Learning Mobile Authoring (LMA) and the Mobile Delivery and Tracking System (MDTS).

The acceptance of learners is measured using Shackel's usability model, consisting of four constructs: effectiveness, learnability, flexibility, and attitude. A survey method, employing questionnaires, is used to collect learners' responses.

The structure of the rest of this paper is as follows. Section 2 describes MobiEnglish, whereas Section 3 explains Shackel's usability model. Section 4 specifies the experiment environment and the methodology of the study is described in Section 5, followed by analysis of the results in Section 6. Finally, the concluding remarks are provided in Section 7.

2 MOBILE LEARNING FOR ESL

2.1 Literature Review

Mobile learning has been used for teaching ESL, in particular for teaching English language words. A mobile learning system, called Mobile Learning Tool (MOLT), was developed at Near East University, Nicosia, Cyprus, where short message service (SMS) messages, containing new technical English language words with and their meanings, are sent to the students throughout the day in half-hour intervals; MOLT was tested on 45 first-year undergraduate students with successful results, where their learning abilities were assessed by performing tests before and after the experiment (Cavus, 2008). In a Turkish university, in order to improve English language learners' vocabulary acquisition, instructional materials were developed to be delivered through mobile phones operated in second generation GSM technology using multimedia messages (MMS), which allowed the

students to see the definitions of words, example sentences, related visual representations, and pronunciations; after the students finished reading the MMS messages, interactive SMS quizzes for testing their learning were sent, where the questions were multiple-choice questions, selected at random from a pool of questions, and the students send their answers to the system via their mobile phones (Saran, 2008).

As learning, in general, demands more personalised and contextualised access to learning resources, PALLAS, a prototype system for mobile language learning, which can be used for teaching ESL, considers dynamic and static parameters, where the dynamic parameters (e.g., location, time, and the mobile device) are updated automatically by the system and the static parameters (e.g., name, age, gender, native language, and leisure time) are provided manually by the learner (Petersen, 2008).

2.2 Requirements of mLearning for Teaching ESL

Most learners of ESL consider ESL as 'the gate' to higher education, employment, economic prosperity, and social status, where learners have to perform well in various English tests in order to pass the "gate," limiting teachers of ESL to provide a truly authentic teaching environment. Therefore, the main purpose of learning English, in the learners' minds, is to pass the exams, where the learners are asked to memorize new words or phrases, become familiar with grammatical exercises, and to make sure that they can do well in all kinds of standardized tests, resulting that most students cannot communicate fluently in English and they have trouble distinctly expressing themselves (Cui, 2008).

It is thus important to create a mobile learning system to support teaching ESL not only for teaching new words, but more as an educational tool, thus contributing to the motivation and success of learners. In particular, the emphasis should be toward developing listening, speaking, and reading skills, with the possibilities for both synchronous and asynchronous interaction. Mobile multimedia content can create a rich learning environment that is particularly suited to the teaching of second and foreign languages. At present, mLearning systems for ESL support mostly static, non-interactive content, where learners can listen and view content, but not do much more. Using current capabilities of mobile computing, a variety of content can be developed for language learning, including (Collins, 2005):

- Short dialogs as conversational models;
- Recorded audio stories with the ability to follow along with the printed text while listening to develop both listening and reading skills;
- Picture dictionaries with illustrations of common objects and actions, plus audio playback of the new language and translations into learners' languages;
- Preparation for tests such as TOEFL;
- Greater interactivity with the content, through the ability to submit student responses;
- Access to teachers and libraries; and
- Ability to interact with other learners, including playing games, conversation, and project-based learning, preferably using the phones' capabilities to take pictures, capture sound, and input text.

2.3 MobiEnglish

MobiEnglish is a mobile learning system, providing supplementary instructional material to support regular face-to-face classroom course for teaching ESL. MobiEnglish provides "anytime and anywhere" resources, rich interaction, powerful support for effective learning, and performance-based assessment. In addition, it is designed to produce support, motivation, continuity, alerts, introductions, tips, revision, and study guides.

MobiEnglish uses ready-made commercial products and tools from Hot Lava Software, namely the Learning Mobile Authoring (LMA) and the Mobile Delivery and Tracking System (MDTS). The LMA enables the instructors and teachers to create, customize, review, and update their own interactive supplementary content (i.e., text, images, audio, and video). MDTS, on the other hand, is a WAP-based environment, having a database of the names and mobile phone numbers of the learners for delivery and management of learning materials.

MobiEnglish is designed to have three modes of operation: offline mode, where the learning material is downloaded into the learner's handheld device; online mode, where the learner interacts with the learning material online; and hybrid mode, where some of the learning material is downloaded into the learner's handheld device but some are to be interacted online. Each mode has its own pedagogical values. The offline mode, however, allows the learner to interact with the learning material any number of times, as desired by the learner, without incurring any additional cost on the learner, other than, of course, the initial airtime cost for downloading the learning material. When the online or hybrid modes are used, MobiEnglish

provides very effective learning tool by tracking the progress of learners and supplies the instructors with statistical reports about the learners such as their duration of usage, scores on the quizzes and tests, weakness points, etc.

The supplementary material is structured into modules, where the instructor specifies the number of the modules and the delivery time for each module. The content of each module is developed using LMA. Upon receiving an SMS message, sent automatically from MDTS, on the learner's mobile phone, the learner simply click on the link provided on the SMS to download the lesson content or to interact with lesson, depending on the usage mode of MobiEnglish.

There are three categories of modules: basic, which contains definitions of some of the words, usage examples of the defined words, and a quiz of multiple-choice questions; enhanced, which contains an audio conversation, a transcript of the conversation, definitions of some of the words used in the conversation, usage examples of the defined words, and a quiz; advanced, which contains a video clip, a transcript of the conversation, definitions of some of the words used in the conversation, usage examples of the defined words, and a quiz. Figure 1 shows snap shot of some screens of MobiEnglish.

In MobiEnglish, the quizzes and tests are multiple-choice questions. But it has the capability for blank filling questions. For multiple-choice questions, MobiEnglish can automatically feedback the correct answers to the learners, as specified by the instructor of the course, after some number of trials, specified by the instructor. However, when MobiEnglish is used in the online mode, the learner performance on the quizzes or tests can be recorded to be examined by the instructors, thus extending the learner-content interaction into instructor-learner interaction.

3 SHACKEL'S USABILITY MODEL

In general, usability (or functionality) refers to the suitability of a product to its intended use, where a product is used in the general sense to mean a d to make the use of a product possible or to support or to restrict its use. Therefore, the concept of usability was explicitly defined in the literature, preparing the ground for the usability measurements.

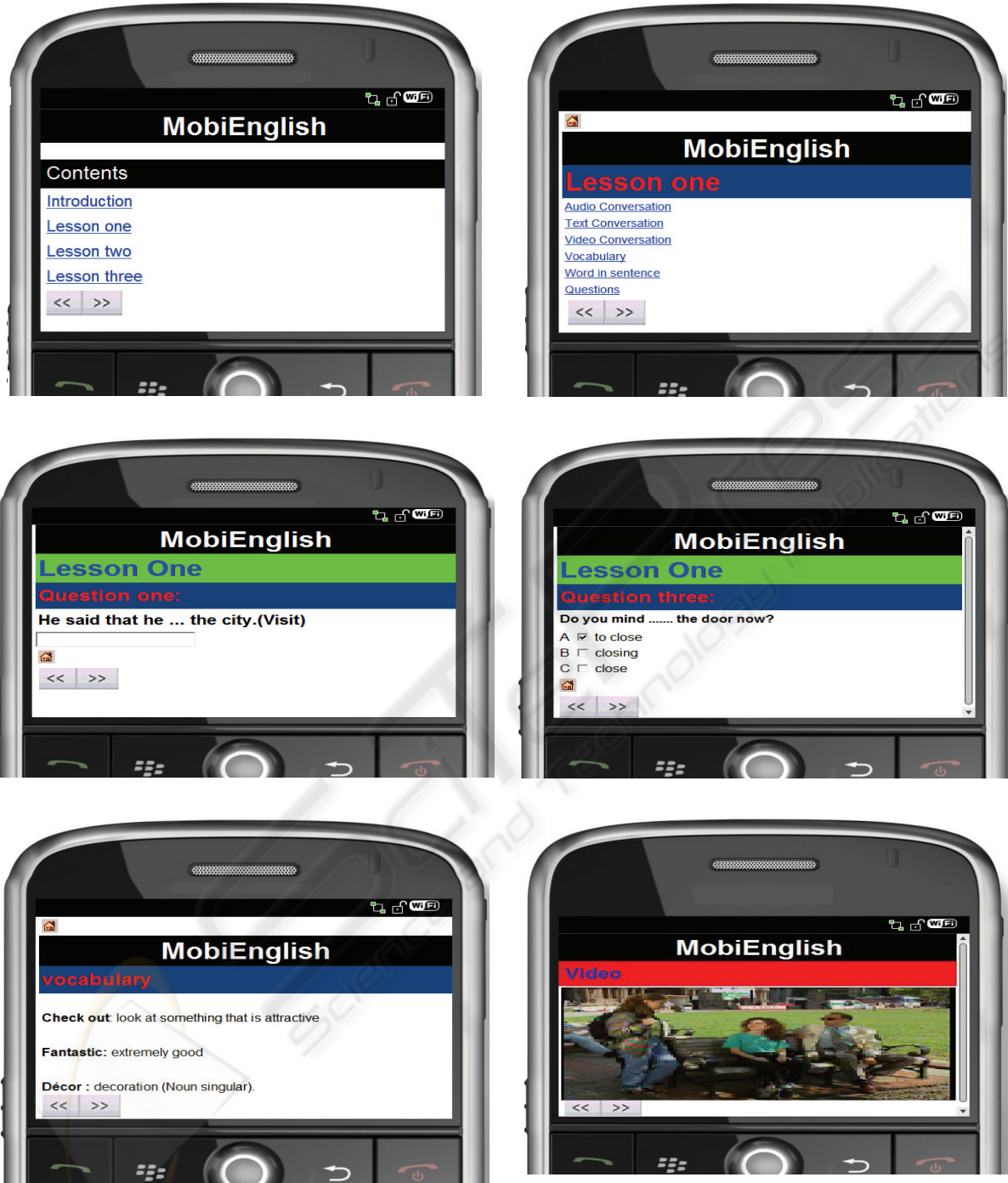


Figure 1: Snap shots of some MobiEnglish screens.

The learning system, where the content is agreed by consulting and to be modified by the learner, falls into the class of “interactive product” (Keinone, 1999). The existing characteristics of this type of products cannot wholly predict its usability, because the responsibility of getting the product to work is shared; it depends not only on the qualities of the product, but on its user as well. When an interactive product gives less than its optimal service, this could be because of its bad design, faulty product, an incompetent user, or the fact that the wrong kind of product has been selected for this user. All these possible reasons have to be investigated before decision about the usability of the interactive product is given. In general, the number of important aspects to measure usability of an interactive product is greater than of other type of products. However, there are several types of criteria that are common to all types of products.

There are three approaches to measure usability: Shackel's approach (Shackel, 1991, Chapanis, 1991, Nielsen's approach (Nielsen, 1994), and ISO 924-part 11 (International Organization for Standardization, 1998). These approaches measure usability at an operational level, considering usability objectives and establishing relationship between usability, utility, acceptance, and affect to the interaction.

Shackel's idea of usability joins usability to other product attributes and higher level concepts. Shackel viewed usability from product perception model, where acceptance is the highest level concept. Thus, acceptance is a function of perceived utility, usability, likeability, and costs.

Utility refers to the match between user needs and product functionality, while usability refers to the ability of the user to utilize the functionality in practice. Likeability refers to affective evaluations, and costs include financial costs as well as social and organizational consequences. Having located usability in the context of acceptance, Shackel presents a descriptive definition of usability as: “Usability of a system or equipment is the capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios” (Shackel, 1991).

Shackel's usability model is the most suitable measure the acceptance of learners for this environment, since it considers usability to be an aspect that influences product acceptance. Indeed according to Shackel's model, usability is a property of a system or a piece of equipment; the property is

not constant but being relative in relation to the users, their training and support, task, and environments. Usability has two sides, one related to subjective perception of the product and the other to objective measures of the interaction.

According to Shackel's usability model, for a system to be usable, it has to achieve defined levels on the following constructs (Shackel, 1991):

◇ **Effectiveness:** It considers the results of interaction in terms of speed and errors.

◇ **Learnability:** It refers to the relation of performance to training and frequency of use, i.e., the novice user's learning time with specified training and retention on the part of casual users.

◇ **Flexibility:** It refers to the degree of adaptation to tasks and environments beyond those first specified; and

◇ **Attitude:** It refers to the acceptable levels of human activities in terms of tiredness, discomfort, frustration, and personal effort.

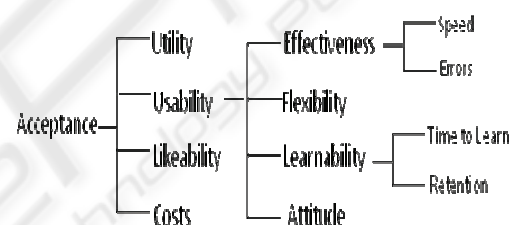


Figure 2: Constructs of Shackel's Usability Model.

4 THE EXPERIMENT

An experiment was conducted on an ESL class, offered at an English language institute, where the class was selected randomly across the available classes at the period of the experiment. The duration of the experiment is 7 weeks, divided into 4 periods; the first three periods consist of two weeks, whereas the last period lasted for one week only. Table 1 shows the number of learners and the mode of use for each period. The contents of MobiEnglish, however, were all specified by the instructors of the courses, where the learners in all the periods received two lessons per week.

In the hybrid mode, the learner answers the quiz online, whereas in the offline mode, the learner is automatically given the correct answers to the quiz questions, after two trails by the learner. In the hybrid mode, the learner can perform the quiz only once with the correct answers fed back automatically after answering each question.

Table 1: Number of learners and usage characteristics of MobiEnglish for each period.

Period	#1	#2	#3	#4
# of learners	20	9	9	9
Category of Content	B	E	A	A
Mode of Usage	O	O	O	H
B: Basic; E=Enhanced; A=Advanced O=Offline; H=Hybrid				

5 METHODOLOGY OF THE STUDY

This study employed a survey method, using a questionnaire to determine the learners' acceptance of MobiEnglish. The questionnaire has been adapted from Shackle's questionnaire, where some changes were applied to suit the need of this study.

The questionnaire contains 20 items based on a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." The response that indicates the lowest approval (i.e., "Strongly Disagree") received a score of 1, with an increase of 1 point for each response (i.e., 2 points for "Disagree," 3 points for "Neutral," 4 points for "Agree,") until the response that indicates the greatest approval (i.e., "Strongly Agree") received a score of 5. Therefore, the maximum score of this instrument is $5 \times 19 = 120$ and the minimum score is 19.

MobiEnglish has the capability to make the learners fill the questionnaires through their mobile phones. But it was decided to use traditional methods because the intended purpose of the project is to study the acceptance of mLearning to support teaching. The acceptance of users to perform surveys using mLearning should be treated separately.

6 ANALYSIS OF THE RESULTS

Data gathered on this questionnaire were coded in SPSS for analysis purposes. The responses of the learners to the questionnaires are summarized in the table given in the Appendix.

As it is clearly shown in the table, the learners' acceptance of MobiEnglish is very high, where most responses score more than 4, implying "Agree." For most of the questions, the scores of responses increase as moving from period 1 to period 4, with some instances where period 4 is lower than period

3; this indicates the increasing level of acceptance of system as the system is used more. Furthermore, this shows the Advanced modules, containing multimedia features (i.e., voice and video), is more appealing to learners.

There are two questions, where their responses came out to be lower than 4 for all the periods; the first question is "I was able to download the learning material without errors" and the second one is "There was too little information to be read, before I can use this mobile learning system." For the first question, the low score in responses could be due to network availability and performance because the score of responses for downloading the Advanced module, containing video, is larger than the score of responses for downloading the Enhanced, containing audio, and the Basic module, containing only text. For the second question, the responses reflect the user guides mentality of users; even though most systems, either hardware or software systems, come with user guides that are seldom used by users. Therefore, users anticipate having some information to come with the system. This comes clear when we consider the responses to the question "It was easy to learn to use this mobile learning system." For this question, the score of responses came out to be greater than 4.2.

7 CONCLUSIONS

MobiEnglish has received high acceptance level with respect to Shackle's usability model. This reflects the potential of using mLearning in teaching foreign languages, in general, and in teaching English, in particular. Furthermore, using the enhanced features of mobile computing with respect to multimedia (i.e., voice and video) is more appealing to learners of ESL.

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APPENDIX

		Period #	Mean of responses			
			1	2	3	4
Effectiveness	I received the SMS messages as specified by the instructor.		4.1	4.8	4.8	4.8
	I was able to download the learning material in reasonable time.		3.9	3.6	4.3	4.2
	I was able to download the learning material without errors.		3.5	3.1	3.8	3.2
	I can effectively complete my work by using this system through my mobile phone or handheld device.		3.4	4.1	4.8	4.7
	This mobile learning system has all the functions and capabilities that I expect it to have.		3.5	4	4.1	4.3
	Overall, this mobile learning system responds to my requests in reasonable time and without errors.		3.5	3.8	4.1	4.3
Learnability	I do not need to learn a lot of things before I could use this mobile learning system.		4	4	3.7	4
	The information provided by the system was easy to understand.		4	4.7	4.6	4.7
	It was easy to learn to use this mobile learning system.		4.2	4.8	4.9	4.5
	There was too little information to be read, before I can use this mobile learning system.		3.3	2.7	3.6	3.5
	Overall, this mobile learning system is easy to use.		4.4	5	5	4.5
Flexibility	I was able to download the learning material at anywhere and anytime through this system.		4.2	4.4	4.6	3.7
	I was able to use the learning material at anywhere and anytime through this system.		4	4.2	4.7	3.8
	Overall, I think this mobile learning system is flexible.		4.2	4.7	4.4	4.3
Attitude	I feel comfortable using this system.		3.9	4.3	4.9	4.3
	I will recommend this system to my colleague.		3.9	4.7	4.6	4.4
	I enjoyed doing my task through this system.		4.1	4.2	4.3	4.5
	I feel that this system is user friendly.		4.1	4.3	4.9	4.5
	Overall, this mobile learning system makes it easy for me to access the required learning material.		3.9	4.7	4.6	4.5